



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

H.A

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,903	04/14/2004	Nikhil Vishwanath Kelkar	NSC1P300/P05882	7593
22434	7590	03/15/2007		
BEYER WEAVER LLP			EXAMINER	
P.O. BOX 70250			ZARNEKE, DAVID A	
OAKLAND, CA 94612-0250				
			ART UNIT	PAPER NUMBER
			2891	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/15/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/824,903

Applicant(s)

KELKAR, NIKHIL VISHWANATH

Examiner

David A. Zarneke

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/19/06.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/28/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/19/06 has been entered.

Response to Arguments

Applicant's arguments filed 11/28/06 have been fully considered but they are not persuasive.

It is argued that Kelkar fails to teach the trim –pads as being solder-wettable because Kelkar teaches forming a non-solder wettable, electrically conductive and non-corrosive protective cap over the trim pads.

Please note that the uppermost layer of the pad itself is made of solder wettable Cu (3, 30+). The fact that Kelkar covers the trim pads with a non-solder wettable, electrically conductive and non-corrosive protective cap doesn't change the fact that the trim pad itself is solder wettable. This is especially relevant since the present claims recite covering the trim pads with an electrically insulating undercoating. To apply this

Art Unit: 2891

argument to the present claims, wouldn't the claimed trim pads being covered with an electrically insulating undercoating mean that they would be non-solder wettable also?

Also, it is argued that the presence of the protective cap would preclude the need for an undercoating because of the redundant nature inherent to using both layers.

Please note, as stated in the previous office action, Kelkar teaches the undercoating provides many benefits other than covering the trim pads. It also insulates the trim pads from the electrical contact (4, 25+). Further, it would provide support for the portion of the trim pad raised above the substrate.

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-9, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelkar et al '158 in view of Alvarez '502.

Regarding claim 1, insofar as definite, Kelkar '158 discloses a method comprising:

providing a semiconductor wafer having a plurality of integrated circuit dice formed therein, the integrated circuit dice including a plurality of electrically conductive contact pads and solder-wettable, electrically conductive trim pads exposed on an active surface of the wafer, wherein the trim pads are not covered by a passivation layer;

forming contact bumps on a plurality of the contact pads; probing the wafer after the contact bumps have been formed, wherein the wafer probing includes,

a trimming operation that includes probing the plurality of electrically conductive trim pads and trimming selected circuits associated with selected trim pads, and

a testing operation that involves probing at least some of the plurality of contact bumps to test selected functionalities of the integrated circuits (Col.4 Line 40- Col.5 Line 40).

Kelkar '158 does not disclose applying an electrically insulative undercoating to the active surface of the wafer that directly covers the trim pads while leaving at least portions of the contact bumps exposed.

Alvarez discloses applying an electrically insulative undercoating to the active surface of a wafer while leaving at least portions of contact bumps exposed (Fig.9 and 10A-10D).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the Alvarez method to coat the Kelkar '158 trim pads on the active surface of a wafer, leaving contact bumps at least partially exposed. The motivation for doing so would have been to streamline semiconductor wafer production by combining trimming and functional probing steps as taught by Kelkar '158 (Col.5 Lines 8-24).

Regarding claims 2 and 3, Kelkar '158 and Alvarez disclose the method of claim 1 and Kelkar '158 further discloses probing for the trimming and testing operations is performed sequentially or substantially simultaneously. Kelkar '158 does not use the terminology of sequentially or simultaneously but they are implied as optional by "A wafer probe is performed to test the contact bumps for functionality and to trim the trim pads so that the die characteristics will meet the required specifications" (Col. 5 Lines 8-10).

Regarding claims 4-9, Kelkar '158 and Alvarez disclose the method of claim 1 and Alvarez further discloses wherein the undercoating is formed from a material selected from the group consisting of: epoxies, polyimides, and silicone polyimide copolymers (7, 76); wherein the undercoating has a final thickness in the range of approximately 0.2 and 4 mils (i.e. 5-100 microns) (7, 68-72); wherein the undercoating is formed from an underfill material (e.g. epoxy) that is suitable for filling a region between a die and a substrate that the die is mounted to after the wafer has been diced

and the die mounted to the substrate (7, 76); wherein the undercoating is formed from a B-stageable material (e.g. epoxy) (7, 76); wherein the undercoating is formed from a curable material, the method further comprising curing the undercoating to permanently affix the undercoating to the surface of the wafer (7, 85); wherein the undercoating is applied by one of a spin-on coating process, a molding process, a screen printing process and a stencil printing process (§ 76-84).

With respect to claim 16, Kelkar teaches the contact pads have metallization stacks [306] formed thereon.

As to claim 17, Kelkar teaches the trim pads have metallization stacks [312] formed thereon.

In re claim 18, Kelkar teaches dicing the wafer after the undercoating has been applied to provide a multiplicity of singulated dice each having an undercoat thereon (4, 36+).

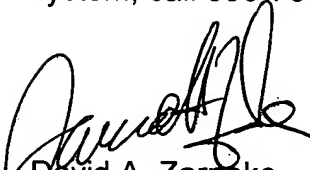
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-Th 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Baumeister can be reached on (571)-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



David A. Zarneke
Primary Examiner
March 2, 2007